FACULTY OF COMPUTER SCIENCE & IT

SYLLABUS

of

Master of Science (Computer Science)

(Semester III - IV)

(Under Continuous Evaluation System)

Session: 2022-23

The Heritage Institution

KANYA MAHA VIDYALAYA JALANDHAR (Autonomous)

Program Specific Outcomes

Master of Science (Computer Science)

(Session 2022-23)

After completing this programme, the students will be able to:

PSO1: Showcase their skillset to apply in the field of IT, academics and other competitive examinations.

PSO2: Comprehend the implementation logic behind the architecture of computers.

PSO3: Apply skills to provide IT based solutions for real world problems through development of software and websites.

PSO4: Contextualize and analyze the problems in hand to work for an IT based solution.

PSO4: Apply principles and techniques from the selective areas to develop special expertise.

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATIONS OF TWO YEAR DEGREE PROGRAMME

Master of Science (Computer Science)

Session 2022-23

Master of Science (Computer Science) Semester – III							
COURSE CODE	**COURSE NAME**	**COURSE TYPE**	**Marks**				**Examination Time (in Hours)**
			Total	**Ext.**		**CA**	
				L	**P**		
MCSL-3111	Data Mining and Data Warehousing	C	100	80	-	20	3
MCSL-3112	System Software	C	100	80	-	20	3
MCSL-3113	Advanced Web Technologies	C	100	80	-	20	3
MCSL-3114	Design and Analysis of Algorithms	C	100	80	-	20	3
MCSL-3115	Software Testing	C	100	80	-	20	3
MCSP-3116	Lab on Advanced Web Technologies	C	100	-	80	20	3
	Total		600				

Note:

C - Compulsory

Kanya Maha Vidyalaya, Jalandhar (Autonomous)

SCHEME AND CURRICULUM OF EXAMINATIONS OF TWO YEAR DEGREE PROGRAMME

Master of Science (Computer Science)

Session 2022-23

Master of Science (Computer Science) Semester – IV							
COURSE CODE	**COURSE NAME**	**COURSE TYPE**	**Marks**				**Examination Time (in Hours)**
			Total	**Ext.**		**CA**	
				L	**P**		
MCSL-4111	Advanced Software Engineering	C	100	80	-	20	3
MCSL-4112	Microprocessor and Its Applications	C	100	80	-	20	3
MCSL-4113	Foundation of Statistical Computing	C	100	80	-	20	3
MCSP-4114	Lab on Foundation of Statistical Computing	C	100	-	80	20	3
MCSD-4115	Project Work	C	200	-	160	40	6
	Total		600				

Note:

C - Compulsory

Master of Science (Computer Science) Semester – III

(Session 2022-23)
COURSE CODE: MCSL- 3111
DATA MINING AND DATA WAREHOUSING

Course Outcomes:

After passing this course the student will be able to:

CO1: Understand the basic concepts, need of data mining and procedure for data pre-processing.
CO2: Analyse architecture of data warehouse.
CO3: Comprehend various data mining and clustering techniques.
CO4: Identify various applications areas, trends and challenges of data mining.

Master of Science (Computer Science) Semester – III

(Session 2022-23)

COURSE CODE: MCSL- 3111
DATA MINING AND DATA WAREHOUSING

Examination Time: 3 Hrs.

Max. Marks: 100
Theory: 80
CA: 20

Instructions for Paper Setter -

Eight questions of equal marks (16 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT I

Data Mining: Introduction, Need of Data mining, Data mining Process, difference between DM & ML.

Data Pre-processing: Pre-processing the data, Data cleaning, data integration, data transformation, data reduction.

UNIT II

Data Warehousing: Concepts of Data Warehousing, difference between operational database systems and data warehousing, Need of a separate data warehouse.

From data Warehouse to Data Mining- OLAP and OLAM, Three Tier Data Warehouse Architecture.

UNIT III

Integration of Data Mining with DB/DW systems: DM Implementation Process, Knowledge discovery in database.

Data Mining Techniques: Classification, Clustering, Regression, Association Rules.

Clustering: Applications, Requirements, Clustering Methods.

UNIT IV

Applications, Trends and Challenges: Introduction to DMQL, Applications of Data Mining, Challenges in implementation of data mining, trends in Data Mining. Basic knowledge about useful data mining tools.

References / Textbooks:

1. Jiawei Han, Micheline Kamber, Jian Pei, Data Mining: Concepts and Techniques, Morgan Kaufmann, 2012.
2. Alex Berson, Stephen J. Smith, Data Warehousing, Data Mining and OLAP, Tata McGraw 2008.
3. Silberschatz, Korth, Sudershan, Database System Concepts, McGraw Hill, 2002.
4. Thomas M. Connolly, Carolyn E. Begg, Database Systems: A Practical Approach to Design, Implementation and Management, Addison-Wesley, 2002.
5. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, Pearson Addison Wesley, 2006.
6. Prateek Bhatia, Data Mining and Data Warehousing: Principles and Practical Techniques, Cambridge University Press,2019.

Note: The latest editions of the books should be followed.

Master of Science (Computer Science) Semester – III

(Session 2022-23)

COURSE CODE: MCSL-3112
SYSTEM SOFTWARE

Course Outcomes:

After passing this course the student will be able to:

CO1: Study and analyse various components of system software like translators, loaders, interpreters, compilers, assemblers etc.

CO2: Apply macros for making the assembly level program modular.

CO3: Analyse the working of different phases of compiler.

CO4: Comprehend different system software like OS, DBMS, text editors etc.

Master of Science (Computer Science) Semester – III

(Session 2022-23)
COURSE CODE: MCSL-3112
SYSTEM SOFTWARE

Max. Marks: 100
Theory: 80
CA: 20

Examination Time: 3 Hrs.

Instructions for Paper Setter -

Eight questions of equal marks (16 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT I

Introduction to System Software: Evolution of System Software, components of system software, Translators, loaders, interpreters, compiler, assemblers.

UNIT II

Assemblers: Overview of assembly process, design of one pass and two assemblers. **Macroprocessors:** Macro definition and expansion, concatenation of macro parameters, generations of unique labels, conditional macro expansion, Recursive macro expansion.

UNIT III

Compilers: Phases of compilation process, logical analysis, parsing, storage management optimisation. Incremental compilers, cross compilers, P code compilers.

UNIT IV

Loaders and Linkage Editors: Basic loader functions. Relocation, program linking, linkage, editors, dynamic linking bootstrap loaders.

Other System Software: Operating system, DBMS, text editors, Interactive debugging systems.

References / Textbooks:

1. Leland L. Beck, System Software: An introduction to System Programming, Addison Wesley, 1997.
2. D.M. Dhamdhere, Introduction to System Software, Tata McGraw Hill, 1986.
3. D.M. Dhamdhere, System Software and Operating Systems, Tata McGraw Hill Education, 1992.
4. Madrich, Stuart, Operating Systems, McGraw Hill, 1974.
5. Stern Nancy, Assembler Language Programming for IBM and IBM compatible computers, John Wiley, 1991.

Note: The latest editions of the books should be followed.

Master of Science (Computer Science) Semester – III

(Session 2022-23)

COURSE CODE: MCSL-3113
ADVANCED WEB TECHNOLOGIES

Course Outcomes:

After passing this course the student will be able to:

CO1: Apply standard, form and validation controls.
CO2: Create master page and database connection.
CO3: comprehend different graphical layouts of website.
CO4: Work on other core issues of website like cookies, caching and dependencies.

Master of Science (Computer Science) Semester – III

(Session 2022-23)

COURSE CODE: MCSL-3113
ADVANCED WEB TECHNOLOGIES

Max. Marks: 100
Theory: 80
CA: 20

Examination Time: 3 Hrs.

Instructions for Paper Setter -

Eight questions of equal marks (16 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

Standard Controls: Display information, accepting user input, submitting form data, displaying images, Using the panel control, Using the hyperlink control.

Validation Controls: Using the required field validator control, using the range validator control using the compare validator control, using the regular expression validator control, Using the custom validator control, Using the validation summary controls.

UNIT-II

Rich Controls: Accepting file uploads, displaying a calendar, displaying advertisement, displaying different page views, Displaying a wizard.

Designing Website with Master Pages: Creating master pages, Modifying master page content, Loading master page dynamically.

SQL Data Source Control: Creating database connections, executing database commands, Using ASP.NET parameters with the SQL data source controls, programmatically executing SQL data source commands, Cashing database data with the SQL data Source controls.

UNIT-III

List Controls: Dropdown list control, Radio button list controls, list box controls, bulleted list controls, custom list controls.

Grid View Controls: Grid view control fundamentals, using field with the grid view control, working with grid view control events extending the grid view control.

UNIT-IV

Building Data Access Components with ADO.NET: Connected the data access, disconnected data access, executing a synchronous database commands, Building data base objects with the .NET framework.

Maintaining Application State: Using browser cookies, using session state, Using profiles.

Caching Application Pages and Data: page output caching, partial page caching, data source caching, data caching, SQL cache dependences.

References / Textbooks:

1. Stephen Walther, ASP.NET 3.5, Pearson Education, 2005.
2. Matthew MacDonald, ASP.NET: The Complete Reference, McGraw-Hill/Osborne, 2002.
3. Imar Spaanjaars, Beginning ASP.NET 3.5, John Wiley & Sons, 2008.
4. Scott Millett, Professional ASP.NET Design Patterns, Wiley, 2010.
5. Glenn Johnson, Programming Microsoft® ADO.NET 2.0 Applications: Advanced Topics, WP Publishers & Distributors Pvt Limited, 2005.

Note: The latest editions of the books should be followed.

Master of Science (Computer Science) Semester – III

(Session 2022-23)

COURSE CODE: MCSL-3114

DESIGN AND ANALYSIS OF ALGORITHMS

Course Outcomes:

After passing this course the student will be able to:

CO1: Analyse performance and complexity of various algorithms.

CO2: Comprehend greedy approach along with its application in various problems.

CO3: Comprehend dynamic programming approach along with its application in various problems.

CO4: Implement backtracking, search and traversal techniques.

Master of Science (Computer Science) Semester – III

(Session 2022-23)

COURSE CODE: MCSL-3114

DESIGN AND ANALYSIS OF ALGORITHMS

Max. Marks: 100
Theory: 80
CA: 20

Examination Time: 3 Hrs

Instructions for Paper Setter -

Eight questions of equal marks (16 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section

UNIT-I

Introduction: Concept of Algorithm, Algorithm Specification, Performance Analysis (Time and Space Complexities), Asymptotic Notations.
Divide and Conquer: General Method, Binary Search, Finding the Maximum and Minimum, Quick Sort, Selection.

UNIT-II

Greedy Method: General Method, Knapsack Problem, Minimum Cost Spanning Trees (Prim's Algorithm, Kruskal's Algorithm) and Single-Source Shortest Path.

UNIT-III

Dynamic Programming: General Single Method, Multistage Graphs, All Pairs Shortest Paths, Single-Source Shortest Paths, Optimal Binary Search Tress, 0/1 Knapsack and Travelling Salesman Problem.

UNIT-IV

Backtracking: General Method, 4-Queens Problem, Graph Coloring and Hamiltonian Cycles.
Search and Traversal Technique: Techniques for Binary Trees, Techniques for Graphs.

References / Textbooks:

1. V. Aho, J.E. Hopcroft, J.D. Ullman, Design and Analysis of Algorithms, Addison Wesley, 1976.
2. Horowitz, S. Sahni, Fundamentals of Computer Algorithms, Galgotia Publishers, 1984.
3. K. Mehlhorn, Data Structures and Algorithms, Vols. 1 and 2, Springer Verlag, 1984.
4. Purdom, Jr. and C. A. Brown, The Analysis of Algorithms, Holt Rinechart and Winston, 1985.
5. D. E. Kunth, The Art of Computer Programming, Vols. I and 3, Addison Wesley, 1975.
6. Anany Levitin, Introduction to the Design & Analysis of Algorithms, Addison, Wesley, 2002.

Note: The latest editions of the books should be followed.

Master of Science (Computer Science) Semester – III

(Session 2022-23)

COURSE CODE: MCSL-3115
SOFTWARE TESTING

Course Outcome:

After passing this course the student will be able to:
CO1: Comprehend fundamental concepts in software testing.
CO2: Analyse various software testing techniques.
CO3: Comprehend object-oriented software testing methods.
CO4: Perform test planning and debugging.

Master of Science (Computer Science) Semester – III

(Session 2022-23)
COURSE CODE: MCSL-3115
SOFTWARE TESTING

Max. Marks:100
Examination Time: 3 Hrs. **Theory: 80**
CA: 20

Instructions for Paper Setter -
Eight questions of equal marks (16 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT - I

Introduction to Software Testing, The Tester's Role in a Software Development Organization, Origins of Defects, Cost of defects, Fundamentals of Test Process, General Principles of Testing, Test Metrics, Role of Testing in SDLC, Comparing Software and Hardware Testing, Verification and Validation.

UNIT - II

Introduction to Test cases, test case design, types of testing , Structural versus Functional Technique Categories, Static versus Dynamic Testing, Control flow & Data flow testing, Random Testing, Requirements based testing, Black Box Testing, White Box Testing.

UNIT - III

Modeling of Software, Object Oriented Modeling based on UML, Requirements and Specifications with Use Case Diagrams; Object Oriented Testing Issues, OO Testing Methodologies, Analysis and Design Testing, UML Based, Class Testing, Integration Testing.

UNIT - IV

GUI testing, Validation testing, Regression testing, Scenario testing, Advances in Software Testing Methods. Test Organization, Test Planning, Test Strategies, Test Prioritization, Debugging. Software test automation – skill needed for automation – scope of automation.

References / Textbooks:

1. Paul Jorgensen, Software Testing: A Craftsman's Approach, Auerbach Publications, 2013.
2. Rex Black, Erik van Veenendaal, Dorothy Graham, Foundations of Software Testing: ISTQB Certification, Cengage Publications, 2015.
3. Glenford J. Myers, The Art of Software Testing, Wiley, 2004.
4. Paul Ammann, Jeff Offutt, Introduction to Software Testing, Cambridge University Press, 2016.
5. Srinivasan Desikan, Ramesh Gopalaswamy, Software Testing: Principles and Practices, Pearson Publications, 2009.

Note: The latest editions of the books should be followed.

Master of Science (Computer Science) Semester – III

(Session 2022-23)

COURSE CODE: MCSP- 3116
LAB ON ADVANCED WEB TECHNOLOGIES

Max. Marks: 100
Practical: 80
CA: 20

Examination Time: 3 Hrs.

Programming Laboratory on Advanced Web Technologies.

Master of Science (Computer Science) Semester – IV

(Session 2022-23)

COURSE CODE: MCSL-4111
ADVANCED SOFTWARE ENGINEERING

Course Outcomes:

After passing this course the student will be able to:

CO1: Comprehend Quality Assurance and Control through application of various quality models.
CO2: Comprehend software risk and configuration management.
CO3: Implement structural modelling of the software.
CO4: Implement behavioural modelling of the software.

Master of Science (Computer Science) Semester – IV

(Session 2022-23)

COURSE CODE: MCSL-4111
ADVANCED SOFTWARE ENGINEERING

Max. Marks: 100
Theory: 80
CA: 20

Examination Time: 3 Hrs.

Instructions for Paper Setter -

Eight questions of equal marks (16 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT I

Software Quality Assurance Concepts and Standards: Quality Concepts, Quality Control, Quality Assurance, SQA Activities, Software Reviews, Formal Technical Reviews, Review Guidelines, Software Reliability, Software Safety, Quality Assurance Standards, ISO 9000, ISO 9001:2000, CMM, TQM, Six Sigma, SPICE, Software Quality Assurance Metrics.

UNIT II

Risk Management and Change Management: Software Risks, Risk Identification, Risk Projection, Risk Refinement, The RMMM Plan, Software Configuration Management, Baselines, Software Configuration Items, SCM Process: Version Control, Change Control, Configuration Audit.

UNIT III

Introduction to UML: Conceptual model of UML, building blocks of UML, Mechanisms in UML

Basic Structural Modelling: Classes, relationships, common mechanisms, class and object diagrams.

Advanced structural Modelling: Advanced classes, advanced relationships, Interfaces types and roles, packages, instances and object diagrams.

UNIT IV

Basic behavioral modelling: Interactions, use cases, Use Case Diagrams, Interaction Diagrams and activity diagrams.

Advanced behavioural modelling: Events and signals, state machines, process and threads, time and space, state chart diagrams.

Diagrams: Collaboration Diagrams and Sequence Diagrams. Component and Deployment Diagrams.

References

1. Ian Sommerville, Software Engineering, Seventh Edition, Pearson Education.
2. R.S. Pressman, Software Engineering: A Practitioner's Approach, Sixth Edition, Tata McGraw-Hill.
3. William E. Perry, Effective Methods for Software Testing, Second Edition, John Wiley & Sons.
4. Paul C. Jorgensen, Software Testing: A Craftsman's Approach, Third Edition, Auerbach Publications,
5. Taylor and Francis Group, 2010.
6. Yogesh Singh, Software Testing, Cambridge University Press.
7. K.K. Aggarwal, Yogesh Singh, Software Engineering, Second Edition, New Age International.
8. Pankaj Jalote, An Integrated Approach to Software Engineering, Second Edition, Narosa.
9. S. Limaye, Software Testing, McGraw-Hill.
10. Grandy Booch, James Rumbough, Ivar Jacobson. 'The Unified Modelling Language User Guide. Pearson Edutaion 2002.
11. Meilir Page Jones, 'Fundamentals of Object Oriented Design in UML', Addison Wesley, 2000

Master of Science (Computer Science) Semester – IV

(Session 2022-23)

COURSE CODE: MCSL-4112
MICROPROCESSOR AND ITS APPLICATIONS

Course Outcomes:

After passing this course the student will be able to:

CO1: Comprehend block structure of microprocessor along with its components.
CO2: Comprehend architecture of 8086 and 8088 microprocessors.
CO3: Articulate memory interface of 8086 and 8088 microprocessors.
CO4: Comprehend I/O interfacing along with interrupt service.

Master of Science (Computer Science) Semester – IV

(Session 2022-23)

COURSE CODE: MCSL-4112
MICROPROCESSOR AND ITS APPLICATIONS

Max. Marks: 100
Theory: 80
CA: 20

Examination Time: 3 Hrs.

Instructions for Paper Setter -

Eight questions of equal marks (16 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT-I

Introduction: Introduction to Microprocessor, General Architecture of Microcomputer System. Microprocessor Units, Input unit, Output unit, Memory unit and auxiliary storage unit.

UNIT-II

Architecture of 8086/8088 Microprocessor: Description of various pins, configuring the 8086/8088 microprocessor for minimum and maximum mode systems, Internal architecture of the 8086/8088 microprocessor, system clock, Bus cycle, Instruction execution sequence.

UNIT-III

Memory Interface of 8086/8088 Microprocessor: Address space and data organization, generating memory addresses hardware organization of memory address space, memory bus status code, memory control signals, read/write bus cycles, program and data storage memory, dynamic RAM system.

UNIT-IV

Input/Output Interface of the 8086/8088 Microprocessor: I/O interface, I/O address space and data transfer, I/O instructions, I/O bus cycles, Output ports, 8255A Programmable Peripheral Interface (PPI), Serial communication interface (USART and UART) – the RS- 232 C interface.

Interrupt Interface of 8086/8088 Microprocessor, Types of Interrupt, Interrupt Vector Table (IVT).

References / Textbooks:

1. Walter Triebel: The 8086 Microprocessor – Architecture, Software and Interfacing Techniques, PHI, Delhi.
2. Gangwar Tripathi, Microprocessor & its Applications, EXCEL Books (2010)
3. Douglas V. Hall: Microprocessors and Interfacing – Programming and Hardware, Tata McGraw Hill Publishing Company Ltd., New Delhi.
4. Ramesh Gaonkar, Microprocessor Architecture, Programming and Applications with 8085 6/e, Penram International Publishing (2013), 6th Edition
5. A Nagoorkani, 8086 Microprocessor & its Applications, McGraw Hill Education (2017), 2nd Edition
6. Singh Anokh and A.K. Chhabra, Fundamentals of Microprocessors and its Applications, S. Chand & Company (2010).
7. R. Theagarajan, Microprocessors and its applications, New Age Publishers (1997), 1st Edition

Master of Science (Computer Science) Semester – IV

(Session 2022-23)

COURSE CODE: MCSL-4113
FOUNDATION OF STASTISTICAL COMPUTING

Course Outcomes:

After passing this course the student will be able to:

CO1: Comprehend basics of Statistical Computing and managing data structures like vector, matrix, etc.
CO2: Create, operate and manage lists and data frames.
CO3: Apply control and I/O statements for generating outputs.
CO4: Simulate various descriptive and analytical algorithms using R language along with their visualization.

Master of Science (Computer Science) Semester – IV

(Session 2022-23)

COURSE CODE: MCSL-4113
FOUNDATION OF STASTISTICAL COMPUTING

Max. Marks: 100
Theory: 80
CA: 20

Examination Time: 3 Hrs.

Instructions for Paper Setter -

Eight questions of equal marks (16 marks each) are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each section. The fifth question may be attempted from any section.

UNIT - I

Statistical Computing: Introduction, Role of Programming and Statistical Software. Data Statistics: Sampling, Cumulative statistics, Statistics for Data frames, matrix objects and lists.

Introduction to R: Introduction to R, Help functions in R, Vectors, Common Vector Operations, Using all and any function, subletting of vector. Creating matrices, Matrix operations, Applying Functions to Matrix Rows and Columns, Adding and deleting rows and columns.

UNIT - II

Lists, Creating lists, general list operations, Accessing list components and values, applying functions to lists, recursive lists

Creating Data Frames: Matrix-like operations in frames, Merging Data Frames, Applying functions to Data frames, Factors and Tables, factors and levels , Common functions used with factors , string operations

UNIT - III

Input/ Ouput: scan() , readline() Function, Printing to the Screen Reading and writing CSV and text file. Control statements: Loops, Looping Over Nonvector, Sets, if-else, writing user defined function, scope of the variable, R script file.

UNIT - IV

Graphics in R: Graph Syntax ((title, xlabel, ylabel, pch, lty, col.), Simple graphics (Bar, Multiple Bar, Histogram, Pie, Box-Plot, Scatter plot, qqplot), Low-level and High-Level plot functions. Using Analytical Algorithms (KNN, K-means, Naive Bayes) for Predictive analysis and Modelling.

References / Textbooks:

1. Andrie de Vries and JorisMeys, R Programming for Dummies, Wiley (2016), 2nd Edition.
2. Sandip Rakshit, R Programming for Beginners, McGraw Hill Education (2017), 1st Edition.
3. Sandip Rakshit, Statistics with R Programming, McGraw Hill Education (2018), 1st Edition.
4. Garrett Grolemund, Hands on Programming with R, O'Reilly (2014), 1st Edition
5. Mark Gardener, Beginning R: The Statistical Programming Language, Wiley (2013)
6. Tilman M. Davies, The Book of R: A first Course in Programming and Statistics, No Strach Press (2016), 1st Edition

Master of Science (Computer Science) Semester – IV

(Session 2022-23)

COURSE CODE: MCSP-4114

LAB ON FOUNDATION OF STATISTICAL COMPUTING

Max. Marks: 100
Practical: 80
CA: 20

Examination Time: 3 Hrs.

Lab on Foundation of Statistical Computing.

Master of Science (Computer Science) Semester – IV

(Session 2022-23)

COURSE CODE: MCSD-4115

PROJECT WORK

Course Outcomes:

After passing course the student will be able to:

CO1: Apply the tools and techniques learnt to frame problems and their corresponding solutions.

CO2: Develop skills necessary to structure, manage and execute projects.

CO3: Demonstrate the skills to work as a member and as a leader of cohesive unit.

CO4: Develop presentation skills.

CO5: Perform documentation related to development of the project.

Master of Science (Computer Science) Semester – IV

(Session 2022-23)

COURSE CODE: MCSD-4115
PROJECT WORK

Max. Marks: 200
Practical: 160
CA: 40

Examination Time:6 Hrs.

1. Candidates have to submit one hard copy and two CDs/DVDs of documentation which shall be kept with the HoD in the college only. Further, supervisor/guide shall forward one copy of DVD /CD containing all the documentation files of the students (file name to be saved as Rollno_of_the_ student.pdf) to the COE Office. The Covering letter (duly signed by the guide and Head of the department) should contain the following information. Candidate name, Candidate Roll no, Project Title of the student and .pdf file name of her project documentation.
2. The assignment shall be evaluated by a board of three examiners (one (01) External examiner as approved by the BOS, one (01) internal examiner and HoD) .
3. The dissertation is to be submitted as per the common ordinances for P.G. courses under semester system.